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The ultimate development of an integrated curriculum will necessitate the development and refinement of a scheme, testing the scheme on both subject matter and real life experiences, and greater utilization of existing resources in vocational education. The analysis, integration, and classification of objectives leading to an integrated curriculum will require various intensive activities: (1) in-residence writing programs, (2) laboratory-classroom opportunities to test germinal ideas, and (3) resources for a national testing program. The rationale for an integrated curriculum is contingent upon the fact that many learning experiences in different subject matter areas are quite similar, therefore an attempt is needed to group learning experiences based on process rather than subject matter. Constructing an integrated curriculum involves: development of behavioral objectives by subject matter, and utilization of a scheme for integrating objectives. Such an approach is expected to be utilized for the Study of Curriculums for Occupational Preparation in Education Project (SCOPE). A major advantage to an integrated curriculum is the resulting improved occupational relevance of subject matter material. (DM)

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ANALYSIS, CLASSIFICATION AND INTEGRATION OF EDUCATIONAL OBJECTIVES[1]

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Why Should There Be an Integrated Curriculum?

The first question we must ask ourselves is: Why should there be an integrated curriculum? Why would it be desirable to organize and group learning experiences in some manner other than by subject matter? Before we develop the technology to implement the strategy of curriculum integration we must first justify in our own minds the use of the strategy at all.

Each subject matter - such as, English, Social Studies, Science, Mathematics, Vocational Education, etc. - has set for itself certain terminal objectives, that is, behaviors and performances toward which it is aiming for its students. In some cases, these terminal objectives have been formalized; more often than not, they are informal. To facilitate the attainment of these terminal objectives by students, the subject matter has included a sequence of learning experiences which the educator has faith will produce the terminal performances when laid end to end. There is little or no attempt to determine whether these are the right learning experiences, whether they are arranged in the right manner, and whether they achieve the desired outcome. The pattern, then, is to arrange such learning experiences leading to certain terminal objectives by subject matter.

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[1] Paper presented at the meeting of the Educational Systems of the '70's network schools, San Mateo, Calif., May 1968.

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We might ask the question: Are the learning experiences included in different subject matters similar - in fact, identical in some cases, - and is it possible to group them into a more meaningful array based on some notion other than subject matter? Immediately the additional question arises: What is meant by more meaningful? If one begins with the axiom that the meaning of education is the preparation for future life, and a future life includes such areas of performance as civics and citizenship, the earning of a living through an occupation, self-development and self-realization, adjustment, and so on, then the meaningful curriculum should include learning experiences which have been grouped in order to achieve these objectives.

One might then respond: Since there are many different occupational contents, if one were to attempt to match learning experiences in the school with future life expectations and encounters, then one would have to cover an extensive number of contents. The answer to this problem is to avoid the use of content at all and to make some attempt to group learning experiences based on process. Individuals in their future lives are going to be called upon to perform a wide variety of processes. These processes will be somewhat general in that they will cut across content areas. To the extent that these processes could be used to group learning experiences that subject-matter experts agree upon as useful in learning a particular subject matter, then it is possible that the subject-matter distinction can be blurred and replaced with a re-grouping of learning experiences based on commonalities in process.

For example, there are many subject matters that call upon students to carry out computations. Computations are called for in mathematics,

in science, in a variety of business areas. The same might be said of communications competencies which are called for in virtually every subject. It would seem reasonable to factor out the communications communality across all subject matters and, thus, present it to all students. The presentation of communications as a process would not be in the absence of content for process cannot exist unless it is applied to some content, but the content would be non-specific to subject matter. It would vary in the course of presenting the process material.

At the moment, because of the subject matter distinction that we draw, it is necessary to group students according to skill level. In fact, grouping practices have gotten to the point where students are grouped immediately upon entering high school and take one of a number of different tracks. In some New Jersey high schools, for instance, we have as many as four or five distinctly defined tracks which begin at the beginning of high school.

If it were possible to group instructional materials according to processes, then one would be likely to discover that all students, regardless of career objectives, must be exposed to a great number of common learning experiences. In fact, it may well turn out that the first two years of high school will be required to provide simply the common learning experiences that all students should have, regardless of their career objectives. Such a process approach would remove much of the underpinning for insidious grouping practices that have turned out to be merely less obvious forms of segregation.

One final issue is relevant with regard to the question of curriculum integration. It is desirable that high school students have at graduation

time the skills necessary to pursue one of a variety of next steps. At present we prepare students for college or "not college". Those not prepared for college are prepared for little of anything. However, it has been estimated that only from 20 to 30 percent of our youth attain a baccalaureate degree. It would be desirable for a student stepping out of high school to have acquired competencies prerequisite to getting a job immediately upon graduation, going on to a post-secondary trade program or community college program, or going on to a full four-year college program. To the extent that the curriculum is integrated and designed according to a learning-experiences approach, the possibility of multiple-alternatives for high school graduates is a much greater one.

There is another issue that must be pursued, if only briefly, in a discussion of the integrated curriculum. We have gained much experience in the field of behavioral technology from the laboratory study of concepts about human behavior that allows us, by proper management of the environment, to exercise significant positive or negative effects on human behavior and performance. One of the fertile fields for the uses of behavioral technology approaches is education. Most people react to behavioral technology as a dangerous, thought-controlling, non-creative, sterile way to make people behave as automatons. This is quite far from the truth. Behavioral technology represents a way, simply, of arming the teacher with the kinds of instructional materials and talents that will enable him to do what little he can toward maximizing outcomes as a result of the learning process. One major technique of the behavioral technologist is contingency management. In contingency management experiences are arranged in a sequence such that the successful performance

of any subsequent experience is built upon what has been gained from previous experiences.

In the course of building an integrated curriculum it will be possible to apply to the task such principles as those which I have just described. For this reason the integrated curriculum will not only feature the revolutionary notion of true integration of subject matter according to experiential relevance, but it will also be possible to organize learning materials in such a way as to maximize the potential for learning. Since the purpose of this presentation is not to dwell on contingency management and the like, I will defer any further comment on it, but will be glad to answer questions about it.

How Does One Construct An Integrated Curriculum

Let me turn now to a discussion of how one goes about constructing an integrated curriculum, at least insofar as I have proposed. The first two steps in generating an integrated curriculum must proceed simultaneously. One of these steps is the rendering of a subject matter into the performance objectives which go to make it up. The other is the development of a scheme for reclassifying learning experiences based on processes rather than subject matter. Let me discuss each in turn.

Behavioral Objectives by Subject Matter

Before you can put the curriculum together in a new way, you must first have a picture of the pieces. The pieces must be analyzed from the whole before they can be synthesized into a new integrated whole.

At the moment, the pieces are cleverly concealed within the framework of subject matter. Therefore, it falls to the subject-matter expert to take his curriculum and analyze it into its component performance objectives. This will not be an easy job because the subject-matter curriculum has not been built on a performance-objectives base. It has, for the most part, evolved in other than the most systematic fashion. For this reason it will require some after-the-fact judgments as to what are the performance expectations associated with each subject in the curriculum.

In generating this encyclopedia of performance objectives associated with each subject in the curriculum, the curriculum expert is encouraged to write objectives in the manner advocated by myself, Robert Mager, Susan Meyer Markle, W. James Popham, and others. That is to say, an objective must include a statement of the behavior or performance that is expected of the learner, special conditions under which it will be elicited, and the criteria which will be used for its evaluation.

However, I would impose one additional requirement upon this task of specifying the performance that is expected of the learner which is perhaps unique to the approach that I have used. I would ask those undertaking this task to restrict themselves to the use of one of the ten action verbs that I will show you. They are only ten of the more than 500 that can be found in the dictionary. There is a big advantage to using one of ten as opposed to using one of 500. The advantage is that when it comes to grouping or coding or interpreting behavioral objectives, there is no guesswork in terms of what action or behavior

is required. Rather than allow the writer of objectives to use action verbs that are unique to his vocabulary and his experiences, it is better to impose upon him a list such as I have produced which can be shared commonly by all who undertake this task.

Now, you will notice after you look at the ten, that of the ten there are five that are, by far, the most elemental and they are: identifying, distinguishing, describing, demonstrating and constructing.[2] (We might, then, have even reduced this list of ten to five; however, the remaining five have been included to give the objective writer some flexibility.)

There are some interesting contingencies built into these action verbs. Before a student can construct or demonstrate some solution which requires some creative or productive act on his part, he usually must be able to describe the relationship which he will then attempt to implement in his demonstration or construction. Thus, describing usually precedes, in a contingency sense, constructing and demonstrating. Moreover, before an individual can describe an activity - a process that requires free recall, he should be able to identify or distinguish the elements of that activity from among others - a process which only requires recognition and discrimination.

There are many features associated with these ten action words. Their use is advocated primarily as a way of imposing some order at the very onset of the activity of writing behavioral objectives, thus

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[2] For the reader's information the other five action verbs are: naming, stating a rule, applying a rule, interpreting, and ordering.

making the task of the integrator simpler in terms of both understanding and organizing.

Using these techniques, a variety of subject-matter specialists will presumably each come up with a volume of performance objectives that represent those they are attempting to obtain as a result of instruction in their subject. Proceeding at the same time should be an attempt to develop, refine, and apply some systematic scheme for classifying behavioral objectives in other than subject-matter terms. I will now show you one such method, called the Process-Object Scheme, which I have developed.

A Scheme for Integrating Objectives

You will notice in this scheme that there are five rows. Each row represents a discrete process. Three of these processes look somewhat like those from Bloom's taxonomy, i.e., Conceptualization, Application and Evaluation, although he does not use these exact words. The other two, Perception and Manipulation are somewhat unfamiliar. However, you will notice that this scheme has a feature which differentiates it distinctly from the Bloom and Krathwohl taxonomies on the one hand, and from the list of processes used by the American Association for the Advancement of Science in "Science - a Process Approach" on the other. That is, this scheme is two-dimensional. It specifies not only the process to be used, but also the object on which the process is to be performed.

If one considers five different objects on which a process can be performed, then these processes which only number five can be multiplied

The PROCESS-OBJECT SCHEME for CLASSIFYING EDUCATIONAL OBJECTIVES

PROCESS	OBJECT: SYMBOLS (1)	IDEAS (2)	THINGS (3)	PEOPLE (4)	SELF (5)
(1) PERCEPTION					
(2) CONCEPTUALIZATION					
(3) APPLICATION					
(4) EVALUATION					
(5) MANIPULATION					

SOME EXAMPLES OF THE CELLS:

3,1 APPLICATION OF SYMBOLS: COMPUTATION

4,2 EVALUATION OF IDEAS: EXPERIMENTATION OR ATTITUDE FORMATION

5,3 MANIPULATION OF THINGS: OPERATING MACHINERY

5,4 MANIPULATION OF PEOPLE: COMMUNICATION

3,5 APPLICATION OF SELF: MOTIVATION

into 25 possibilities. Let us take some examples. With regard to conceptualization, one can think about, or conceptualize, in the area of symbols or ideas, both of which represent abstract thought about things, an activity more concrete than thoughts about people and about the self. The conceptualization of self would be usually referred to as self-concept.

In terms of application, a person might be called upon to make some application with symbols. We would, generally, consider this to be computation.

Evaluation in the areas of symbols and ideas puts us in the range of conceptual judgment; whereas, evaluation in the areas of people and self puts us into the affective domain and refers to attitudes. When we evaluate things which are objective, then we are exercising, ordinarily, logic or some logically derived process; whereas, when we evaluate in the subjective areas of people and self, we are working within the field of attitudes.

Finally, manipulation. We manipulate things when we construct something - certainly a category which is relevant to vocational education. We manipulate ourselves when we try to modify our own behavior and we manipulate people through the process of communication. You can see that this scheme can cover a wide number of possibilities.

I am not suggesting that the Process-Object Scheme I have proposed is the only basis for classifying objectives, nor am I even suggesting that my approach is ready for use. However, the Process-Object Scheme represents a possibility, at least, about which some examples can be given, and can thus be used for illustrative purposes.

Let us say that our subject-matter experts have delivered their encyclopedia of performance objectives while, at the same time, this scheme has been developed and refined and is ready for use. The next step is the actual classification of performance objectives, and this classification can, and should, proceed at many levels. First of all, this classification can be done in terms of the action verb that has been used. Secondly, it is possible to have the subject-matter expert provide some coding for the nature and level of the subject matter included in the performance objective itself. And finally, and most importantly, classification by process and object can proceed.

In order to facilitate this classification, it would be necessary to write specific definitions for each of the 25 cells of the 5 x 5 process-object matrix, and in each case to specify words or phrases upon which the classification judgment would be made. It would then be possible, perhaps, to develop a computer program that would react to incoming objectives in terms of the scheme and classify them. It might not make an appropriate classification in each instance because of the subtlety and multi-meanings of words in the English language, but it could be possible to go through the list and then refine the judgment based on computer classification. This is something that should be explored. At worst, it can be done by human beings.

Once all of the objectives have been classified according to an integration scheme such as the one presented here, each objective would be coded to indicate its classification. A card sorter could then be used for grouping the performance objectives according to the process-object code. Thus, the traditional subject matter curriculum would

have first been analyzed into performance objectives; second, these objectives would be classified using the Process-Object Scheme; and third, these coded objectives would be integrated into a new curriculum reflecting the philosophy and organization of the coding scheme.

It would be interesting, after having the integrated objectives printed out according to the process-object code, to see what kind of a new grouping was discovered. In some cases one might see by examination that the communality among objectives in diverse subject areas was so strong and so obvious as to reinforce one's approach to integration. However, in some cases, performance objectives categorized by this scheme would be so heavily loaded with high-level content that it would seem unwise to perform the grouping, in which case certain learning experiences could be grouped according to this scheme and others not. That is, it is not absolutely necessary that the entire curriculum be grouped on an integrated basis. However, it is likely that much of the curriculum will become rebuilt once this technique is used because it is possible that the most prominent part of the curriculum is process-relevant rather than content-relevant.

The Integrated Curriculum and Educational Issues

We require all high school students to take biology, yet we do not expect them all to be pursuing biologically-relevant careers in their future life. We are interested, however, in their learning something about life processes and about human functioning to dispel various myths and inaccurate notions that they have previously held. That is, we are

interested in altering their perceptions, contributing to their conceptualizations, modifying their applications, and extending both their evaluations and manipulations.

We are interested in doing the same thing in many other subjects, or at least some of the same things, and we will begin to discover that there is much in common, I suspect, between our subject matters. This communality can then be taken advantage of in curriculum building and program scheduling.

I must reveal to you that my interest here is more than just casual, as some of you already know. I have developed a program which I call the SCOPE program. SCOPE stands for the Study of Curriculums for Occupational Preparation in Education. I am particularly interested in the occupational and occupationalizing aspects of education. It is assumed that all people will pursue an occupation and that a high school education is, in most ways, prerequisite to that occupational pursuit. For some of these people a four-year college education must also be pursued as a prerequisite to that occupation and, in some cases, even additional graduate or professional education is necessary.

However, the majority of our youth - and this majority has been numbered to range between 70 and 80 percent - will not pursue a full college education beyond high school and yet these youth must go out and get a job - a job for which, incidentally, they have not been trained. Most of these youngsters take the so-called "general" curriculum which leads nowhere. Others take a college-preparatory curriculum which leads somewhere, but not where they are going. And, finally, a small group

take a vocational curriculum which is, in many senses, both restrictive and stigmatizing.

The answer, I strongly suspect, to this problem of how to increase the career alternatives and particularly the occupational preparation for this large group of youngsters who will not go to college, or who will not complete college, lies in the integrated-curriculum approach which I have advocated and spoken about here. By integrating objectives according to process and object, experiences relevant to a wide variety of occupations would be more likely to be included than they are now on a subject-matter basis wherein certain subject matters are either systematically excluded or labelled in such a way as to make their avoidance likely. That is, all graduates will have more experiences which are relevant to future occupational behavior when the curriculum is integrated than they will when it is not, because built into the curriculum will be processes which are more relevant to occupational behavior than those which are included on a haphazard basis in the present curriculum.

It is expected, within the integrated curriculum approach, that something can be done along these lines to increase occupational relevance. This is not to advocate, even at this point, an enlargement of traditional vocational education per se. While, like all forms of education, vocational education has done some things right and some things wrong, it may be argued at this time that what is to be proliferated are not traditions, but experiences, which on a logical basis, or an analytical basis, would seem to be occupationally relevant.

Incidentally, such occupational relevance may be a sufficiently

inducing feature of a curriculum to help those students who reject school entirely because of its lack of relevance, to develop certain basic skills in reading, writing, and arithmetic that they have not previously been able to acquire because they were not willing to tolerate the manner in which these subjects were taught. Moreover, these students have traditionally been grouped together and labelled as slow learners. Integrating the curriculum will allow them to be integrated into the mainstream of the student body. Thus, the notion of "integration" is multi-faceted.

Conclusions

The ultimate development of the integrated curriculum will necessitate the development and refinement of the scheme which has been presented to you this morning, or some alternative scheme; the testing of this (or an alternative) scheme by trying it out as a fit on both subject-matter experiences and real-life experiences; and the greater utilization of existing resources in vocational education in the area of curriculum development than is being done at present.

Finally, the analysis, integration, and classification of objectives leading to the integrated curriculum is going to require the kinds of intensive activities that other national curriculum projects have found necessary. I speak from experience after having worked on the AAAS program. That is, there will be the requirement of various in-residence writing programs which probably will proceed during the summer, of laboratory-classroom opportunities in which germinal ideas can be tested, and, finally, a need for the resources necessary for running a national testing

program which will take place within the ES'70 system. For all of these services some centralization is required.

As Mort Sahl once observed: "The future lies ahead". While intended as a truism in most areas of life, it is perhaps a word to the wise in education. The integrated curriculum would truly seem to be a major step ahead.

ADDENDUM

The SCOPE Program

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SCOPE is an acronym for the Study of Curriculums for Occupational Preparation and Education. Its major objective is to coordinate and contribute to a national curriculum development effort at the secondary school level aimed at increasing the relevance of high school education for the large majority of our youth who must seek employment (or further job training) upon graduation. To serve the needs of these youth, the curriculum of the secondary school will require the inclusion of experiences relevant to future employment needs. Thus, the SCOPE Program has aims which interface with those of the Educational Systems of the '70's program.

Funding has been requested for the first phase of the SCOPE Program, named Project CONECT, another acronym standing for the Coordination of Occupational and Non-occupational Curriculums and Technologies. The objectives of this first phase of the SCOPE Program are as follows:

(1) To establish a functional communication link between the state-supported vocational curriculum development centers.

(2) To increase the familiarity of the directors of the above centers with recent advances in behavioral approaches to curriculum development, devices, and evaluation.

(3) To refine and test a scheme for reorganizing educational objectives in terms of the behavioral process used to accomplish each objective and the object of the process in each instance (the process-object model).

(4) To develop a detailed plan of activity for Phase II of the SCOPE Program including the identification of staff and facility needs.

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[1] Dr. Tuckman obtained a Ph.D. in Psychology from Princeton University in 1963. He is presently Associate Professor of Education at Rutgers, holding joint appointments in Educational Psychology and Vocational-Technical Education.

There are approximately 15 State-supported vocational curriculum development centers throughout the country that have been involved for some time in the development of curriculum materials. These centers could become a significant resource in future attempts to provide greater occupational relevance to secondary education if they were to function in a more coordinated manner, and if they were to become sufficiently cognizant of and enthusiastic about present modernizing trends in the production of curricular materials. The first two objectives represent an attempt to accomplish both coordination and stimulation among these centers.

Present plans in the ES '70 program call for an attempt to reorganize the high school curriculum in a direction away from separation of subject matter based on discipline toward an integration of subject matter based on learning objectives. To this end, many subject matter experts may be called upon to identify the educational objectives included in their area of the high school curriculum. Thus, given the "pieces", it will be necessary to put them together in some meaningful way. The process-object model for the integration of objectives is an attempt to structure learning experiences in a manner more consistent with their application to the tasks of life than the present subject matter breakdown. During the first phase of SCOPE, this scheme will be refined, written about, and tested.

If national curriculum reform at the secondary school level is to become a reality, and if this reform is to move the curriculum toward greater relevance for more students, then some central coordination of activities will be required. Planning for a SCOPE Center to participate in the development and coordinating of such national efforts will be undertaken as the final task of the first phase.